Properties of 1H18N9T steel measured by Mösbauer spectroscopy

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Mössbauer spectroscopy was used for investigation of the phase transition from γ-Fe (fcc) phase to α-Fe (bcc) phase and the residual stress caused in paramagnetic 1H18N9T stainless steel by expansion of lattice cells after plastic deformation.

Information about that hyperfine interaction can be determined experimentally from the analysis of the Mössbauer spectrum. Interpretation of isomer shift in various solids containing ^{57}Fe by means of Hartree-Fock calculations with the various 3*d* configurations are presented by Walker *et al.* [1]. The residual stress σ can be obtained from the Mössbauer spectra by analysis of *IS* [2-5].

The stainless austenic steel 1H18N9T used in the present measurements has $3d^7 4s^x$ electronic configuration, fcc structure and is paramagnetic at room temperature T_0, *i.e.* the Mössbauer spectrum is composed of only one line. The centre of this maximum shifts with pressure, indicating change in *4s*-electron density at the nucleus.

The isomer shift for 1H18N9T samples of different thickness was measured, before and after deformation which causes compression and expansion of the crystal cells.Values of the residual stress were obtained for the samples taking into account the calibration factor. Phase transmission on the surface samples, caused by expansion of the crystal cells, from γ-Fe (fcc) to α-Fe (bcc) was also observed.

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